

April 28, 1959

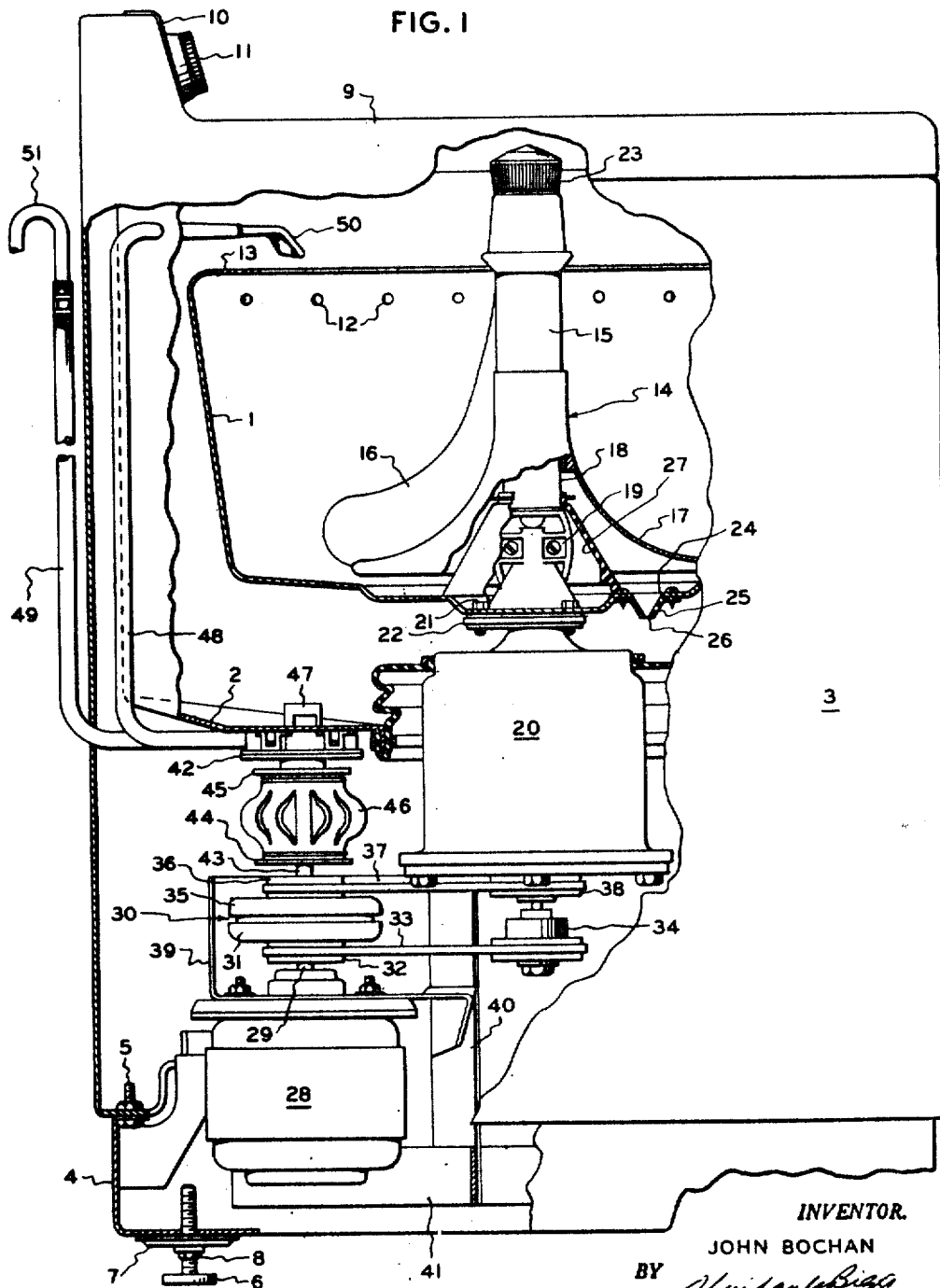
J. BOCHAN

2,883,843

CLOTHES WASHER WITH LIQUID RECIRCULATION SYSTEM

Filed Nov. 12, 1954

2 Sheets-Sheet 1



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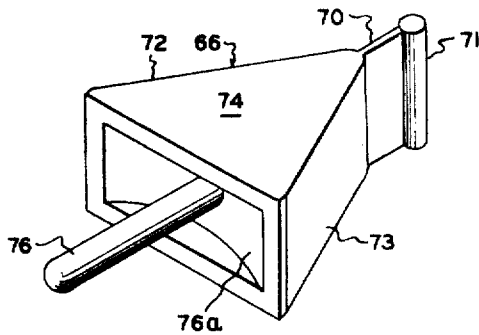
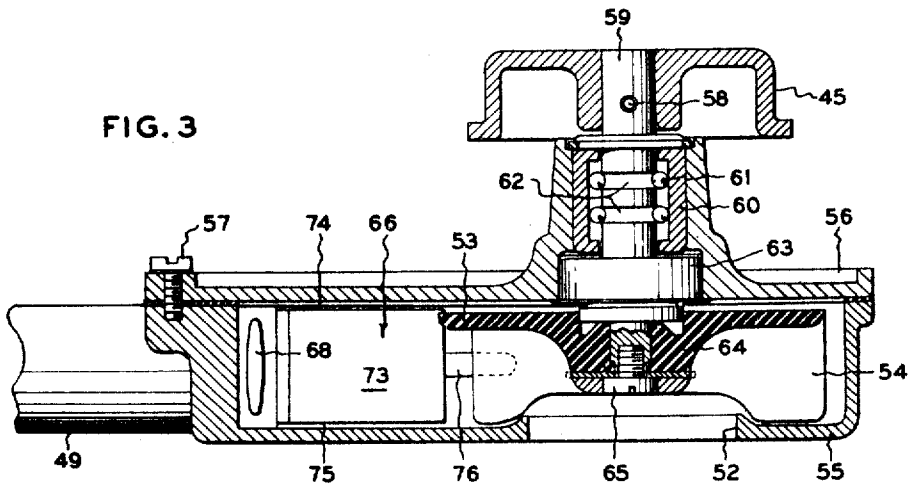
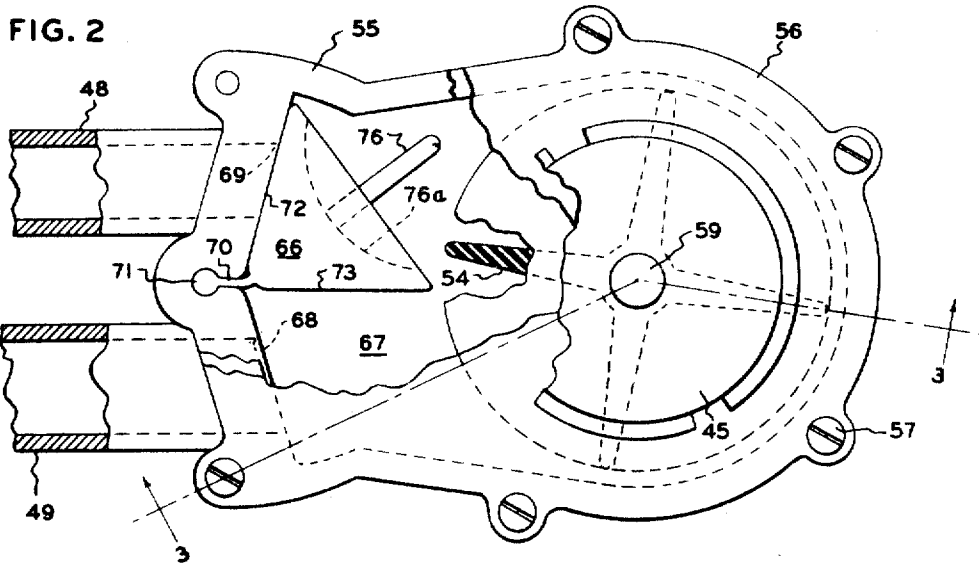
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CLOTHES WASHER WITH LIQUID RECIRCULATION SYSTEM

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2 Sheets-Sheet 2



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2,883,843

CLOTHES WASHER WITH LIQUID RECIRCULATION SYSTEM

John Bochan, Louisville, Ky., assignor to General Electric Company, a corporation of New York

Application November 12, 1954, Serial No. 468,460

15 Claims. (Cl. 68—23)

This invention relates generally to laundry apparatus such as clothes washing machines, and to an automatic drive and liquid flow control system used with such apparatus.

An object of this invention is to provide an automatic washing machine featuring recirculation of washing liquid along with agitation during a wash cycle, and automatic extraction of liquid with discharge to a drain during a drying cycle, with selection of washing and drying operations and of their respective recirculation and discharge of liquid being automatically accomplished by control of the direction of rotation of a main drive motor.

Another object of my invention is to provide an automatic washing machine of this type having a single pump both for recirculating liquid during the washing operation and for discharging liquid to the drain during the centrifugal extraction operation, which pump automatically shifts its discharge from the recirculation conduit to the drain conduit and vice versa in response to the direction of rotation of the drive motor as the drive motor reverses to proceed from the washing operation to the centrifugal extraction operation and vice versa.

A further object of this invention is to provide a two-way pump having a common inlet and two outlets, and means responsive to the direction of pump rotation automatically controlling flow through one or the other of the outlets depending upon the direction of rotation.

Another object of this invention is to provide a pump of the type having a generally axial inlet with tangential flow from the pump impeller, and which includes means within the pump directing discharge to one of two outlet ports, dependent upon the direction of impeller rotation.

Briefly stated, in accordance with one aspect of my invention, a washing machine, of the type including washing means within a centrifugal extraction basket, is driven through a mechanism including a reversible drive motor. The same drive motor operates a pump having two outlets with automatic valve means controlling flow through one or the other outlet depending upon direction of rotation. Thus, upon one direction of motor rotation, the washing means is effective to perform a washing operation within the basket while the pump is effective to recirculate washing liquid within the machine. Upon reverse motor rotation, the basket is rotated at high speed for centrifugal extraction while the pump automatically becomes effective for discharging the washing liquid to a drain.

In accordance with a further aspect of this invention, a centrifugal pump of the type having an impeller rotating within a pump chamber includes an inlet into the pump chamber and two outlets. Flexible slipper means sensitive to the direction of impeller rotation seals one of the outlet ports upon impeller rotation in a first direction and the other port upon opposite rotation.

My invention will be better understood from the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

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In the drawings, Fig. 1 is a side elevation, with certain surfaces broken away and partially in section, of an automatic clothes washing machine embodying my invention; Fig. 2 is a partially sectionalized bottom view of a liquid pump in accordance with this invention; Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2; and Fig. 4 is an enlarged perspective view of a component of the pump illustrated by Figs. 2 and 3.

Referring now to the drawings, in Fig. 1 I have shown my invention as embodied in an automatic clothes washer of the type having a rotatable clothes basket 1 mounted within an outer enclosing tub 2 which is supported within and enclosed by exterior cabinet structure 3. In a conventional manner, the cabinet structure includes a base assembly 4 secured to the cabinet by any suitable fastening means such as 5. So that the machine may be levelled for optimum operation, a plurality of adjustable levelling feet 6 are provided, extending through reinforcing plates 7 on the base with an appropriate locknut 8 provided in each case. The cabinet structure also includes a top 9 preferably formed integrally with a backsplash panel 10 upon which may be mounted appropriate control knobs 11 by which an operator can select operation of the machine for performance of the desired sequence of operations.

In the particular form of washing machine illustrated herein, wash basket 1 is of the type adapted to contain the articles to be laundered and a charge of washing liquid. As shown, the side walls of the basket incline upwardly and outwardly with a plurality of overflow and liquid discharge apertures 12 in the portion of the basket adjacent the upper edge at maximum diameter. The uppermost edge of the basket is rolled inwardly at 13, or may be otherwise arranged to provide a clothes retainer preventing flotation and projection of articles of clothing from the basket during washing and extracting operations. The washing means is shown herein in the form of an agitator 14 having a center post 15 from which extend a plurality of radial agitating vanes 16 projecting upwardly from a downwardly and outwardly flared skirt 17 as shown.

Basket 1 and agitator 14 must, of course, be independently rotatable. For example, in accordance with this arrangement it is contemplated that the agitator will be driven with an oscillatory motion to perform the washing operation in a substantially stationary basket; while for extraction of liquid from the laundry articles, both agitator and basket are rotated at a high speed. Correspondingly, a central basket hub 18 is secured by any appropriate clamping means such as 19 to a spin tube (not shown) projecting upwardly from a drive mechanism 20. Hub 18 carries basket 1 through fastening devices 21 extending through the bottom wall of the basket into a hub flange 22. In a conventional manner, agitator 14 is driven through an independent shaft (not shown) extending upwardly from transmission 20 to an appropriate driving connection adjacent the upper portion of center post 15. A knurled acorn nut 23 secures the agitator in position and completes the driving connection. While the particular form of transmission assembly 20 and the driving connections therefrom to basket 1 and agitator 14 form no part of the present invention, reference is made to Patent No. 2,639,618 issued to J. W. McNairy on May 26, 1953, assigned to the General Electric Company, assignee of the instant application, wherein a typical construction suitable for practice of the present invention is shown and described.

The present invention is directed to that type of washing machine in which the washing liquid is constantly recirculated during the washing action. In such a recirculation system, washing liquid flows from wash basket 1 into outer tub 2 throughout the washing period and is

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pumped back into the wash basket. As a part of this recirculation system, I have shown basket 1 as including an aperture 24 in the bottom wall thereof, and with an inverted conical discharge nozzle 25 having a small port 26 through which washing liquid and small insoluble soil particles may pass into outer tube 2. As shown, nozzle 25 is located under skirt 17 of the agitator in an area of limited turbulence, in which the insoluble soil particles tend to collect. Such particles are prevented from entering the static zone adjacent the basket hub by means of a boot 27 extending from basket hub 18 downwardly and outwardly to a radius approaching the radius of discharge nozzle 25. It is, of course, also possible that a substantial quantity of liquid will be discharge through the upper apertures 12 in the basket during recirculation and washing action. The particular construction of the basket with the nozzle arrangement 25 and boot 27 does not form a part of the present invention, but is disclosed and claimed in the co-pending application of William R. Molnar application Serial No. 468,459, filed November 12, 1954, now Patent No. 2,807,949, and assigned to the General Electric Company, assignee of this application.

The power source for driving basket 1 and agitator 14 is shown as an electric motor 28; and in accordance with the present invention, this motor is reversible, depending for example upon the relative polarities of connections to windings in the motor. Motor shaft 29 is connected to a bi-directional centrifugal clutch assembly 30 as described in detail in the aforementioned McNairy Patent 2,639,618. This bi-directional clutch assembly upon one direction of rotation transmits torque from motor shaft 29 through the lower clutch half 31 integral with a drive pulley 32 to a flexible belt 33, which in turn drives the agitator input drive pulley 34. During drive through the lower clutch half 31, the upper clutch half 35 remains substantially stationary. However, upon reverse rotation of motor shaft 29, the upper clutch half 35 is driven, thereby to transmit rotation through its integral drive pulley 36 and flexible belt 37 to an input pulley 38 for rotation of extraction basket 1. This invention is not limited to the particular form of drive shown, since other types of transmissions may be employed, which upon one direction of motor rotation operate agitation means within the washing receptacle, and which upon reverse motor rotation drive a wash receptacle for centrifugal extraction.

Preferably, the basket and agitator, transmission 20, motor 28, and clutch assembly 30, are all supported on a framework as a unit to make up the moving system, in contrast to the outer cabinet and tub structure which forms the stationary system. Such a construction is desirable inasmuch as conditions of unbalance must be expected during centrifugal extraction. Therefore, gyrations of the basket of a limited extent are commonplace. Thus in Fig. 1, motor 28 is shown as secured to a mounting sled 39 which in turn is welded or otherwise secured to a vertical support member 40 extending downwardly from transmission assembly 20 to a suspension frame 41. Frame 41 may be suspended from base structure 4 in any suitable manner, preferably including appropriate vibration damping means (not shown).

For providing recirculation of washing liquid discharged into the outer tub, and for disposal of the washing liquid on conclusion of an operation, I provide a pump assembly 42 secured to the bottom wall of outer tub 2. The pump is driven from motor 28 through a motor shaft extension 43 having secured thereon a drive coupling plate 44. Pump 42 has a similar drive plate 45 in generally aligned relationship, and these two drive plates are connected together by means of a flexible connection 46. This flexible connection 46 is so constructed as to transmit driving torque from motor shaft 43 to the pump, while permitting relative motion of

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the motor with respect to the pump due to gyrations of the moving system. In Fig. 1, pump 42 is shown as having an inlet baffle 47 to prevent entrance of undesirably large articles into the pump.

Pump 42 discharges either through a recirculation hose 48 or a hose 49, constituting a drain, depending upon the direction of motor rotation. As clearly shown by Fig. 1, the upper end of the circulation hose 48 is provided with an appropriate nozzle 50 discharging into wash basket 1. The drain hose may be provided with a goose neck 51 adapted to rest on the upper edge of a stationary tub, drain standpipe, or the like.

With the construction as thus far described, it is to be understood that when motor 28 rotates in a first direction, providing drive through clutch half 31 to the agitator input pulley, the agitator is driven within basket 1 to provide the desired washing action. At the same time, liquid discharges from nozzle 25 and through overflow apertures 12 into outer tub 2, and is recirculated by pump 42 back to basket 1. Upon conclusion of the washing operation, the direction of motor rotation is reversed, thereby providing a drive to rotate basket 1 at high speed for centrifugal extraction. At the same time, the change in the direction of rotation of pump 42 renders it effective to discharge all liquid in the outer tub through drain hose 49.

In Figs. 2, 3 and 4, the details of the liquid pump are shown, this pump functioning upon one direction of rotation to cause flow through recirculation line 48 and upon opposite rotation through drain hose 49.

Generally speaking, the pump herein is of the type having a generally axial inlet 52 and generally tangential discharge. The pump impeller is shown as of the type having a circular skirt 53 from which project a plurality of radial impeller vanes 54. The impeller in the usual manner rotates within a pump housing comprising a roof 55 and base plate 56 secured thereto with appropriate fastening devices such as screws 57, the pump being shown upside down in Fig. 3.

Rotation of the impeller results from its drive connection with motor 28, as previously explained in connection with Fig. 1. As shown most clearly by Fig. 3, the drive plate 45 is pinned at 58 to a pump shaft 59. Pump shaft 59 is journaled with respect to the pump housing cover by means of an antifriction bearing here shown as consisting of an outer race 60 with one or more rows of anti-friction balls 61 rolling in grooves 62 in the pump shaft. An appropriate liquid seal structure 63 is, of course, employed to prevent entrance of liquid into the bearing. A hub 64 of the impeller is keyed to pump shaft 59 and is secured thereto by a threaded fastening member 65, as clearly shown in Fig. 3. Thus, rotation of motor 28 is transmitted directly to the pump impeller.

As thus far described, this pump acts generally in the manner of a centrifugal pump taking in liquid through the axial inlet with tangential flow from the impeller. Thus, if no arrangement were employed to control the flow, the pump would tend to discharge through both discharge lines at the same time upon either direction of rotation.

As shown by Figs. 2 and 3, flow control through one or the other of the discharge lines is controlled by a flexible flipper indicated generally by reference numeral 66 and directly exposed to the flow of liquid which results from the action of the pump impeller. To accommodate flipper 66, the pump housing is enlarged to include a valve chamber 67, which chamber includes a valve port 68 for drain line 49 and a corresponding port 69 for recirculation line 48. The planes through ports 68 and 69 preferably are somewhat angularly disposed in the relationship shown.

Flipper 66, shown in perspective in Fig. 4, and in operative positions in Figs. 2 and 3, preferably is molded or

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otherwise formed from rubber or similar flexible, plastic-like material. However, it may be of rigid construction providing that appropriate sealing engagement with respective outlet parts is achieved. A hinge portion 70 of relatively thin cross-section connects an anchoring bead 71 to the main body of the flipper. Thus, the flipper is free to move between the position shown in Fig. 2 and an opposite position in which port 69 is opened and port 68 is closed. The side walls 72 and 73 of the flipper which function to open and close the discharge ports are in planes angularly disposed so that when the flipper is in a sealing position as shown in Fig. 2, or in the opposite position, a plane passing through the exposed side wall extends approximately through the axis of the impeller. In practice, it has been found that a slightly wider angle between side walls 72 and 73 will result in a somewhat increased discharge head; while a slightly smaller angle between the planes of the side walls 72 and 73 will improve the characteristics of the discharge system from the standpoint of lint collection on the valving surfaces. Hence, as shown by Fig. 2, it is preferred that when the flipper is in the position shown, the plane of surface 73 is radial with respect to the axis of the impeller; while with the flipper in its opposite position closing port 68, the plane of side surface 72 again is in radial relationship with the axis of the impeller. The top and bottom surfaces 74 and 75 of the flipper preferably are flat and have a relatively close clearance with the corresponding interior surfaces of the pump body to eliminate areas upon which lint collects and builds up.

In Fig. 2, flipper 66 is shown in the position occupied when the pump impeller is rotated in a clockwise direction. Surface 72 of the flipper is sealed against port 69 and the flipper remains in this position due to the pressure relationships existing within valve chamber 67. In particular, it should be noted that the flipper closely approaches the periphery of the impeller. Thus, liquid discharged in a generally tangential direction from the impeller exerts a pressure against surface 73 tending to retain the flipper in the position shown.

The end of the flipper opposite the impeller may be formed with a concave surface 76a as shown to assure adequate clearance when the flipper moves from the position shown in Fig. 2 to the opposite position wherein surface 73 seals against valve port 68. Centrally located on this concave surface is a projecting tongue 76 which functions to assure a positive motion of the flipper when the direction of impeller rotation is reversed. Thus, upon reversal in direction of rotation of impeller 54, flipper 66, due to the close clearance with the periphery of the impeller immediately tends to move away from its closed position with respect to port 69. However, as soon as the flipper has moved to an intermediate position, then the pressure relationships on opposite sides of the flipper tend to be approximately the same, and it is found in practice that there is some difficulty in assuring that the flipper will positively close against the opposite discharge port upon reversal of rotation. It is for this purpose that the projecting tongue 76 is provided, of sufficient length to be positively engaged by the impeller blades, thereby to impart positive movement of the flipper to its opposite position.

From the foregoing description, operation of this two-way pump becomes evident. Upon clockwise impeller rotation as shown in Fig. 2, port 69 associated with the recirculation hose 48 is closed. Thus, liquid is pumped through drain hose 49. Upon opposite rotation of the impeller, in a counter-clockwise direction as viewed in Fig. 2, flipper 66 reverses its position to seal off port 68 for the drain hose and open port 69 of the recirculation hose. The flipper therefore constitutes a reversible valve means which is alternatively movable to close either port 68 or port 69. Thus, a pump and recirculation system are provided whereby upon motor rotation in a first direction, a drive to an agitation means is effected

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and the pump is driven in a direction providing recirculation from the outer tube into the wash basket. Upon reversal of the direction of rotation of the motor, under the control of any suitable sequential control, or by manual selection of a knob 11, the transmission automatically rotates the basket at high speed for centrifugal extraction, or other liquid extraction means are brought into effect, and at the same time the pump becomes effective to discharge the contents of the outer tub to the drain.

While this invention has been described by reference to a particular embodiment thereof, it is to be understood that numerous modifications may be made by those skilled in the art without actually departing from the invention. It is, therefore, the aim of the appended claims to cover all such equivalent variations as come within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a clothes washing machine, a washing container, washing means associated with said container for washing fabrics within said container, liquid extraction means associated with said container for extracting liquid from the fabrics in said container, a drain, a drive mechanism including a reversible drive source for operating said washing means and said extraction means selectively dependent upon direction of rotation of the drive source, and means driven from said drive source and positioned to receive liquid from said container, said drain being connected to said driven means, said driven means being responsive to the direction of rotation of said drive source to recirculate washing liquid from said container for return to said container during washing action and to discharge to said drain during extraction.

2. In a clothes washing machine, a washing container, washing means associated with said container for washing fabrics within said container, liquid extraction means associated with said container for extracting liquid from the fabrics in said container, a drive mechanism including a reversible drive source for operating said washing means and said extraction means selectively dependent upon direction of rotation of the drive source, a drain, a pump driven from said same drive source having an inlet and two outlets, means connected to one of said outlets for recirculating washing liquid from said container back into said container during operation of the washing means, the other of said outlets discharging to said drain, and valve means within said pump operable responsive to direction of rotation of said pump to open said recirculation outlet during washing and said drain discharge during extraction.

3. In a clothes washing machine, a clothes containing basket in which a washing operation takes place and which includes means for discharging liquid during washing, agitation means within said basket, an outer tub surrounding said basket to receive liquid discharged from said basket, a drive mechanism including a reversible drive motor for driving said agitation means for washing action and for rotating said basket at high speed for liquid extraction with discharge into said outer tub, the drive of said agitation means and said liquid extraction means being selectively dependent upon direction of motor rotation, a drain, a pump driven by said motor having its inlet connected to said outer tub, a recirculation outlet from said pump, means connected to said recirculation outlet for returning liquid to said basket, a discharge outlet from said pump for discharging liquid to said drain, and valve means within said pump actuated in response to direction of motor rotation to adjust said pump to recirculate washing liquid during agitation and to discharge to said drain during centrifugal extraction.

4. In a clothes washing machine, a clothes containing basket in which a washing operation takes place, agitation means within said basket, an outer tub surrounding said basket to receive liquid discharged from said basket, a drive mechanism including a reversible drive motor for

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operating said agitation means for washing and for rotating said basket at high speed with discharge into said outer tub for liquid extraction, the drive of said agitation means and said basket being selectively dependent upon direction of motor rotation, a pump driven from said motor having its inlet connected to said outer tub, a recirculation outlet from said pump, means connected to said recirculation outlet for returning liquid to the basket from said outer tub, a discharge outlet from said pump, and valve means within said pump, actuated in response to direction of motor rotation to open said recirculation pump outlet and close said discharge outlet during agitation, and to close said recirculation outlet and to open said discharge outlet during centrifugal extraction.

5. A centrifugal pump comprising a housing defining a pump chamber, an impeller for rotation within said chamber, an axial inlet through which fluid enters said pump chamber, two outlet ports from said chamber in side-by-side relation and opening into separate discharge passageways, and a flipper positioned intermediate said outlets moveable to alternative positions, said flipper blocking one of said outlets in one of said positions and blocking the other of said outlets in the other of said positions, said flipper being directly exposed to the flow leaving said impeller for actuation thereby to its alternative blocking positions for alternative directions of impeller rotation.

6. A centrifugal pump comprising a housing defining a pump chamber, an impeller for rotation within said chamber, an inlet through which fluid enters said pump chamber, two outlet ports from said chamber in side-by-side spaced relation and opening into separate discharge passageways, and flexible flipper means sealing one of said outlet ports on impeller rotation in a first direction and said other port upon opposite rotation, said flipper being directly exposed to the flow leaving said impeller for actuation thereby.

7. A centrifugal pump comprising a housing defining a pump chamber, an impeller for rotation within said chamber, an inlet through which fluid enters said chamber, two outlet ports from said chamber in side-by-side spaced relation and opening into separate discharge passageways, and a flipper having a hinged connection with said housing and positioned intermediate said outlets to block alternately one and the other of said outlet ports responsive to direction of impeller rotation, said flipper being directly exposed to the flow leaving said impeller for actuation thereby.

8. In a centrifugal pump, a pump housing including an axial inlet and two lateral outlets, an impeller rotatable within said housing and having a common axis with said inlet, and means for sealing off respectively one of said outlets on one direction of impeller rotation and said other outlet on opposite rotation, said means comprising a flipper member of generally triangular configuration positioned intermediate said outlets and including sealing surfaces respectively cooperable with said outlet ports, hinge means connecting said flipper to said housing, an end surface of said flipper member opposite the impeller closely approaching the periphery of said impeller and having a centrally located flexible projection extending from said end surface into interference relation with said impeller in an intermediate position of said flipper, whereby upon one direction of rotation said flipper is moved to sealing engagement with one outlet under the combined influence of mechanical and hydraulic forces and reverses to seal the other outlet upon reverse rotation.

9. In a centrifugal pump a housing having a pump chamber and a valve chamber, an inlet into said pump chamber, an impeller rotatable within said pump chamber to move liquid from said inlet to said valve chamber, two outlets from said valve chamber in side-by-side angularly spaced relation, a flexible flipper pivotally connected to said housing intermediate said outlets and extending to a position in which an edge thereof approaches the periphery of said impeller, said flipper having side sealing sur-

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faces cooperable respectively to seal said outlets and being angularly disposed in respective sealing positions with the exposed surface lying in a plane extending through the axis of rotation of said impeller, and a tongue projecting from said flipper and occupying a position clear of said impeller when said flipper is in sealing engagement with an outlet and in interference with said impeller in intermediate positions between said outlets.

10. A centrifugal pump comprising a housing including a pump chamber and valve chamber, an inlet into said pump chamber, an impeller rotatable within said pump chamber for moving liquid from said inlet to said valve chamber, two outlet ports from said valve chamber in side-by-side relation, flexible flipper means sealing one of said outlet ports on impeller rotation in a first direction and said other port upon opposite rotation, and means forming part of said flexible flipper positively engaged by said impeller upon reversal of the position of said flipper.

11. A centrifugal pump comprising a housing including a pump chamber and a valve chamber, an impeller for rotation within said pump chamber, an inlet into said pump chamber, two outlet ports from said valve chamber, a flexible flipper pivotally connected to said housing intermediate said outlet ports and movable from a position sealing one of said outlet ports to a position sealing the other of said outlet ports depending upon direction of impeller rotation, a tongue projecting from said flexible flipper extending toward said impeller and in interference relation therewith in intermediate non-sealing positions of said flipper.

12. A centrifugal pump comprising a housing defining a pump chamber, an impeller for rotation within said chamber, an inlet through which fluid enters said chamber, two outlet ports from said chamber in side-by-side spaced relation and each opening into a separate discharge passageway, flexible flipper means sealing one of said outlet ports on impeller rotation in the first direction and the other of said ports upon opposite rotation, said flipper being directly exposed to the flow leaving said impeller for actuation thereby and being secured to said housing at its end remote from said impeller.

13. In a washing machine, article washing means including a washing receptacle, reversible pump means having intake means and two discharge means, means for conducting liquid from said receptacle to said pump intake means, recirculation means connected to one of said pump discharge means and having an outlet discharging into said receptacle, a drain means connected to the other of said pump discharge means and having an outlet for discharging liquid from said machine, valve means arranged to open said one discharge means and close the other discharge means in response to one direction of operation of said pump means, said valve means being arranged to open said other discharge means and close said one discharge means in response to the other direction of operation of said pump means, and a reversible drive source for driving said pump means in either direction.

14. In a washing machine, clothes treating means for washing clothes and for extracting liquid from said clothes, said clothes treating means including a receptacle for the clothes, a reversible pump having an inlet positioned to receive liquid from said receptacle, a recirculation outlet, and a drain outlet, means connected to said recirculation outlet for recirculating the washing liquid to said receptacle, means connected to said drain outlet for discharging said liquid from said machine, a reversible motor connected to said pump for driving said pump in opposite directions during the washing operation of said machine and the extraction action thereof, and means actuated in response to the direction of rotation of said pump for opening said recirculation outlet and closing said drain outlet during said washing operation and for opening said drain outlet and closing said recirculation outlet during said extraction operation.

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15. In a washing machine, article washing means including a washing receptacle, a reversible drive source for driving said washing means upon one direction of rotation of said drive source, and reversible pump means driven by said drive source and having intake means and two discharge means, means for conducting liquid from said receptacle to said pump intake means, recirculation means connected to one of said pump discharge means and having an outlet discharging into said receptacle, drain means connected to the other of said pump discharge means and having an outlet for discharging liquid from said machine, and valve means arranged to open said one discharge means and close the other of said discharge means in response to one direction of operation of said pump means, said valve means being arranged to open said other discharge means and close said one

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discharge means in response to the other direction of operation of said pump means.

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Disclaimer

2,883,843.—*John Bochan*, Louisville, Ky. CLOTHES WASHER WITH LIQUID RECIRCULATION SYSTEM. Patent dated Apr. 28, 1959. Disclaimer filed July 12, 1963, by the assignee, *General Electric Company*.

Hereby enters this disclaimer to claims 1, 2, 3, 4, 13, 14 and 15 of said patent.
[*Official Gazette September 24, 1963.*]